



# Winter Solstice

On the longest night of the year, starry skies are empty, and the world pauses in the lull between autumn and winter. After this longest night, the coldest days follow, but each day the dusk falls a few minutes later as the North begins its slow return march to the sun.

This star map is for Rhode Island at 7 PM on December 21. East and West are reversed because the perspective is from the ground looking up rather than from the sky looking down.

In the North are Ursa Major and Ursa Minor. The North Star, Polaris, is the tail end of Ursa Minor.

In the course of a Northern winter's night, all of the stars in the heavens rotate clockwise more than 180° around Polaris, because it happens to lie almost exactly at the celestial north pole.

Polaris, moves across the sky on a fixed path while other

For thousands of years, humans worldwide have used calendars to track time, and to decide when it is the right time to do a thing: planting crops or setting out on journeys, for example.

Some calendars are based on the moon; others keep time in regard to the universe of stars; and yet more have been devised in regard to our own, closest star, the sun.

A stargazer will find information using calendar systems based on both the solar day and the stellar day.

**solar day** The daily calendar we use is based on the length of time between the two yearly equinoxes- moments when the sun is directly overhead. In this solar calendar a day is 24 hours.

**stellar day** A star calendar counts sidereal or stellar time. In relation to the earth's daily spin, the far flung stars are basically fixed. A complete revolution of the earth in terms of the stars takes 23 hours and 56 minutes.

constellations spin slowly around it at a rate of about one degree each 4 minutes. Stars that appear close to the North Star move less perceptibly than those farther away (Aquarius in the South, for example).

To see the movement of the stars, try spotting a star in relation to a crook in the shadowy branch of a tree, or next to the corner of a neighboring roof, and then return to it later in the evening, or at the same time for a few nights.

It might be nice to have a sense of self as a speck on the surface of a planet tipping through space, meeting each next constellation as an old friend.

How can an earth day be longer than a star day?

Any given point on earth not only rotates into a sun rise each day, but also advances in orbit around the sun as the day goes on. This motion literally extends the day by moving the point of sun set four minutes ahead. Those four minutes added to the 23:56 stellar day result in the 24 hour day which makes our calendar work.

While we count 365.24 solar days in the year, 366.24 stellar days pass. The mismatch between our rotation through day and night and our rotation within the universe of stars around us results in stars that begin their progress through the sky from a slightly different position every night.

Despite the variation from night to night, the same stars appear at the same times each the year; hence star charts.

